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(54) ORGANIC ELECTROLUMINESCENT IMAGE DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an organic electroluminescent image display device which has a high luminance and displays an image with high quality.

SOLUTION: The organic electroluminescent image display device comprises a color filter layer, a color change fluorescent material layer, a transparent protecting layer, transparent electrode layers, an organic electroluminescence cell layer, and back electrode layers provided in sequence on a transparent substrate. A plurality of portions where the transparent electrode layers crossing the back electrode layers through the organic electronic electroluminescence cell layer serve as pixels. The transparent protecting layer is formed into a lenticular lens shape so that lenticular lens elements in a convex state on the organic electroluminescence cell layer side agree with the pixel arrays.

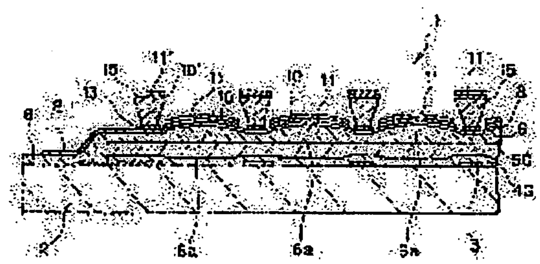

FIG. 2

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ORGANIC ELECTROLUMINESCENT IMAGE DISPLAY DEVICE

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SOLUTION: The organic electroluminescent image display device comprises a color filter layer, a color change fluorescent material layer, a transparent protecting layer, transparent electrode layers, an organic electroluminescence cell layer, and back electrode layers provided in sequence on a transparent substrate. A plurality of portions where the transparent electrode layers crossing the back electrode layers through the organic electronic electroluminescence cell layer serve as pixels. The transparent protecting layer is formed into a lenticular lens shape so that lenticular lens elements in a convex state on the organic electroluminescence cell layer side agree with the pixel arrays.

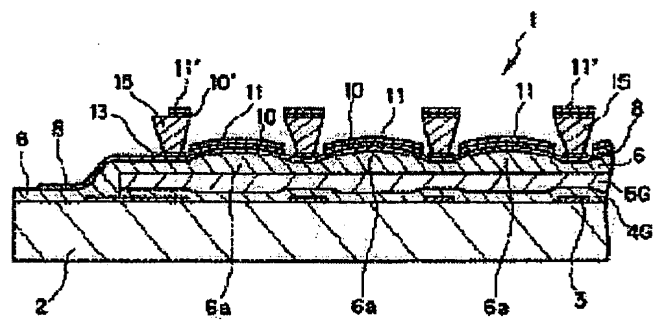

FIG. 2

CLAIMS

[Claim(s)]
[Claim 1]
The color filter layer, color conversion fluorescent substance layer which were prepared one by one on the transparence base material and this transparence base material, transparent protection layer, a transparent electrode layer, and an organic electroluminescent element layer -- and Two or more parts where it has a back plate layer at least, and said transparent electrode layer intersects said back plate layer through said organic electroluminescent element layer A picture element and nothing, Said transparent protection layer is an organic electroluminescent image display device characterized by being the lenticular lens configuration which it has so that the lenticular lens element which became a convex configuration at said organic electroluminescent element layer side may be made in agreement with a picture element array.
[Claim 2]
The height of said lenticular lens element is an organic electroluminescent image display device according to claim 1 characterized by being within the limits of 5-20 micrometers.
[Claim 3]
Said lenticular lens element is an organic electroluminescent image display device according to claim 1 or 2 characterized by for the average of the distance between the top-most vertices of the heights which it has concavo-convex structure on a front face, and this concavo-convex structure adjoins being within the limits which is 0.1-5 micrometers, and being within the limits whose average of the distance to the bottom point of the crevice perpendicularly located between said heights from the straight line which connects between the top-most vertices of the heights which said concavo-convex structure adjoins is 0.1-5 micrometers.
[Claim 4]
The organic electroluminescent image display device according to claim 1 to 3 characterized by having the black matrix which has a predetermined opening pattern between said transparence base materials and said color filters.
[Claim 5]
It is the organic electroluminescent image display device according to claim 1 to 4 characterized by for said organic electroluminescent element layer being blue luminescence, and equipping said color conversion fluorescent substance layer with the green conversion layer which changes blue glow into green fluorescence and emits light, and the red conversion layer which changes blue glow into red fluorescence and emits light.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to an organic electroluminescent image display device, especially relates to the organic electroluminescent image display device in which image display with it is possible. [high luminescence brightness and] [good]
[0002]
[Description of the Prior Art]
The organic electroluminescence (EL) component has advantages, like that visibility is high, that they are all solid-state displays unlike a liquid crystal display, seldom being influenced of a temperature change, and an angle of visibility is large by self-coloring, and the utilization as a pixel of an image display device etc. is progressing in recent years.
As an image display device using an organic EL device (1) What formed the organic EL device layer in three primary colors by the predetermined pattern for every luminescent color, (2) Use the organic EL device layer of white luminescence, use the thing and the organic EL device layer of (3) blue luminescence which are displayed through a color filter in three primary colors, and the color conversion fluorescent substance layer using a fluorochrome is installed. What changes blue glow into green fluorescence or red fluorescence, and indicates by three primary colors is proposed.
[0003]
However, in the above-mentioned organic electroluminescence image display device of (1), although the drawing effectiveness of each coloring light is high, it is difficult to make the property of the organic EL device of each color into homogeneity, the process which forms an organic EL device layer in three primary colors by the still more detailed pattern is complicated, and fertilization is made difficult.
Moreover, in the above-mentioned organic electroluminescence image display device of (2), when a color filter in three primary colors decomposes the white light, the luminous efficiency of Isshiki in three primary colors falls to 1/3 of the white light, drawing effectiveness is bad, for this reason, an efficient white organic EL device is needed, but the white organic EL device obtained by being stabilized in sufficient brightness is not yet obtained.
On the other hand, since the conversion efficiency of a color conversion fluorescent substance layer is determined by the product of light absorption effectiveness and fluorescence effectiveness in the above-mentioned organic electroluminescence image display device of (3), three-primary-colors luminescence with very high conversion efficiency is possible by using a fluorochrome with high light absorption effectiveness and fluorescence effectiveness.
[0004]
[Problem(s) to be Solved by the Invention]
Generally, in an image display device, brightness is an important factor, and it is the same also in the organic electroluminescence image display device which used the above color conversion fluorescent substance layers. In an organic electroluminescence image display device, since the whole luminescence

brightness is adjusted according to the luminescence brightness from a color conversion fluorescent substance layer, the whole luminescence brightness will become high by making high the luminescence brightness from a color conversion fluorescent substance layer. And it considers as the approach of making high the luminescence brightness from a color conversion fluorescent substance layer, and there are an approach of raising the luminescence brightness of the organic EL device layer which is the light source, and the approach of gathering the conversion efficiency in a color conversion fluorescent substance layer. However, the organic EL device which is stabilized and maintains high brightness is not yet obtained, and there is a limitation also in the improvement in conversion efficiency in a color conversion fluorescent substance layer, and it must have to be stabilized in brightness sufficient by any approach.

[0005]

Moreover, from the organic EL device layer which is the light source, since light is emitted to an omnidirection, while the use effectiveness of the light which emitted light is low and causes trouble to the above-mentioned improvement in brightness, when incidence is carried out to the color conversion fluorescent substance layer which are other picture elements which the light emitted to the omnidirection from the organic EL device layer adjoins, there is also a problem of causing deterioration of image display quality.

This invention is made in view of such the actual condition, and aims at offering the organic electroluminescent image display device with high brightness in which the image display of high quality is possible.

[0006]

[Means for Solving the Problem]

In order to attain such a purpose, the organic electroluminescent image display device of this invention The color filter layer, color conversion fluorescent substance layer which were prepared one by one on the transparence base material and this transparence base material, transparent protection layer, a transparent electrode layer, and an organic electroluminescent element layer -- and Two or more parts where it has a back plate layer at least, and said transparent electrode layer intersects said back plate layer through said organic electroluminescent element layer A picture element and nothing, Said transparent protection layer was taken as a configuration which is the lenticular lens configuration which it has so that the lenticular lens element which became a convex configuration at said organic electroluminescent element layer side may be made in agreement with a picture element array.

As other modes of this invention, the height of said lenticular lens element was considered as a configuration which is within the limits of 5-20 micrometers.

[0007]

As other modes of this invention, said lenticular lens element had concavo-convex structure on the front face, and it is within the limits whose average of the distance between the top-most vertices of the heights which this concavo-convex structure adjoins is 0.1-5 micrometers, and considered as a configuration which is within the limits whose average of the distance to the bottom point of the crevice perpendicularly located between said heights from the straight line which connects between the top-most vertices of the heights which said concavo-convex structure adjoins is 0.1-5 micrometers.

It considered as a configuration which is equipped with the black matrix which has a predetermined opening pattern between said transparence base materials and said color filters as other modes of this invention.

As other modes of this invention, said organic electroluminescent element layer is blue luminescence, and said color conversion fluorescent substance layer was considered as a configuration which is equipped with the green conversion layer which changes blue glow into green fluorescence and emits light, and the red conversion layer which changes blue glow into red fluorescence and emits light.

[0008]

In above this inventions, the operation to which nothing and the concavo-convex structure further prepared in the front face of a lenticular lens element make the above-mentioned condensing operation more efficient for the operation which condenses the light by which each lenticular lens element

prepared in transparent protection layer is emitted to an omnidirection from an organic electroluminescent element layer in the corresponding color conversion fluorescent substance layer of a picture element is made.

[0009]

[Embodiment of the Invention]

Hereafter, it explains, referring to a drawing about this invention.

Drawing 1 is the part plan showing 1 operation gestalt of the organic electroluminescent (EL) image display device of this invention, drawing 2 is drawing of longitudinal section in the II-II line of the organic electroluminescence image display device shown in drawing 1 , and drawing 3 is drawing of longitudinal section in the III-III line of the organic electroluminescence image display device shown in drawing 1 . In addition, at drawing 1 , in order to show the auxiliary electrode 7 and the transparent electrode layer 8 which are mentioned later, where a part of blue organic EL device layer 10 and back plate layer 11 are cut and lacked, it is shown. In drawing 1 - drawing 3 , the color filter layer 4 which the organic electroluminescence image display device 1 becomes from band-like red coloring layer 4R, green stain layer 4G, and blue coloring layer 4B through the black matrix 3 equipped with the predetermined opening pattern on the transparence base material 2 and this transparence base material 2 is formed.

[0010]

On this color filter layer 4, the color conversion fluorescent substance layer 5 which consists of red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G and blue conversion dummy layer 5B is formed. each class which constitutes this color conversion fluorescent substance layer 5 has green red conversion fluorescent substance layer 5R on green stain layer 4G on red coloring layer 4R -- blue conversion dummy layer 5B is arranged for conversion fluorescent substance layer 5G by band-like on blue coloring layer 4B, respectively. The physical relationship of such a color filter layer 4 and the color conversion fluorescent substance layer 5 is shown in drawing 4 . However, at drawing 4 , in order to show the condition of the black matrix 3 and the color filter layer 4, where a part of color conversion fluorescent substance layer 5 is cut and lacked, it is shown.

[0011]

Transparent protection layer 6 is formed on the transparence base material 2 so that such a color conversion fluorescent substance layer 5 may be covered, and the auxiliary electrode 7 and the transparent electrode layer 8 are arranged and formed in band-like from the surrounding terminal area to the central pixel field on this transparent protection layer 6. Drawing 5 is the part plan showing the condition that the auxiliary electrode 7 and the transparent electrode layer 8 are formed on transparent protection layer 6, in this way. In this invention, as shown in drawing 2 and drawing 5 , transparent protection layer 6 is a lenticular lens configuration which has lenticular lens element 6a (part which attached and showed the slash to drawing 5) which became a convex configuration at the blue organic EL device layer 10 side. And each lenticular lens element 6a is arranged so that at least each part which the transparent electrode layer 8 and the back plate layer 11 intersect through the blue organic EL device layer 10 may be in agreement with a (picture element) (it is located on each array of a picture element like). Therefore, the auxiliary electrode 7 and the transparent electrode layer 8 are arranged so that two or more lenticular lens element 6a of a boiled-fish-paste configuration may be overcome one by one.

[0012]

Moreover, in the organic electroluminescence image display device 1 of this invention, the band-like transparent electrode layer 8 and band-like right angle which were arranged as mentioned above are intersected, and the band-like blue organic EL device layer 10 and the band-like back plate layer 11 are formed on transparent protection layer 6 (on lenticular lens element 6a) so that it may be located on opening of the black matrix 3. Moreover, the band-like transparent electrode layer 8 and a band-like right angle are intersected, and the septum section 15 is formed through the insulating layer 13 on transparent protection layer 6 (part located between each lenticular lens element 6a) so that it may be located on the protection-from-light section of the black matrix 3. Dummy organic EL device layer 10' and back plate layer 11' are formed in the up flat surface of this septum section 15, and in formation of

the blue organic EL device layer 10 which used the septum section 15 as a patterning means, and the back plate layer 11, in order to form a band-like pattern, these are formed, as a result of making an unnecessary formation ingredient adhere to the septum section 15 and eliminating it so that it may not reach on the transparent electrode layer 8.
In addition, in the example of illustration, although the insulating layer 13 is formed only in the formation part of the septum section 15 in the shape of a stripe, it may be the insulating layer 13 which consists of a pattern of a grid configuration with which at least each part with which it is not limited to this, and which the transparent electrode layer 8 and the back plate layer 11 intersect through the blue organic EL device layer 10 has opening in a (picture element).
[0013]
With the above organic electroluminescence image display devices 1 of this invention, by blue conversion dummy layer 5B, blue glow which emitted light in the blue organic EL device layer 10 is made into red fluorescence in red conversion fluorescent substance layer 5R, and is made into green fluorescence in green conversion fluorescent substance layer 5G, blue glow penetrates as it is, after that, color correction of the light of each color is carried out in the color filter layer 4, and a three-primary-colors display is made. And the light emitted to an omnidirection from the blue organic EL device layer 10 is condensed by the color conversion fluorescent substance layer of a picture element which corresponds by lenticular lens element 6a prepared in transparent protection layer 6. for example, in one picture element in which band-like red conversion fluorescent substance layer 5R (transparent electrode layer 8) and the back plate layer 11 are formed by crossing through the blue organic EL device layer 10 In the part located in this picture element part among one lenticular lens element 6a, the light emitted to an omnidirection from the blue organic EL device layer 10 corresponding to that picture element is condensed by red conversion fluorescent substance layer 5R corresponding to that picture element. Therefore, the use effectiveness of the light emitted from the blue organic EL device layer 10 improves sharply, and becomes what has high luminescence brightness. Moreover, it is prevented that the light emitted to an omnidirection from the blue organic EL device layer 10 carries out incidence to the color conversion fluorescent substance layer 5 of other adjoining picture elements. Thereby, the image display of high quality is possible.
[0014]
In addition, with the above-mentioned operation gestalt, as for two or more lenticular lens element 6a which transparent protection layer 6 has, it is arranged by parallel, respectively so that it may be in agreement with the formation location of the band-like blue organic EL device layer 10 and the back plate layer 11, but the array direction of lenticular lens element 6a is not limited to this, and it may be arranged by parallel, respectively so that it may be in agreement with the formation location of the band-like transparent electrode layer 8.
Moreover, although each configuration layer of color filter layer 4 grade is prepared through the black matrix 3, you may be the gestalt which is not equipped with the black matrix 3.
furthermore, the color conversion fluorescent substance layer 5 is as green as red conversion fluorescent substance layer 5R which changes blue luminescence from the blue organic EL device layer 10 into red fluorescence and green fluorescence -- what is limited to this although it has conversion fluorescent substance layer 5G -- it is not -- luminescence (blue) wavelength -- a long wave -- what is necessary is just to have a color conversion fluorescent substance layer convertible into merit's fluorescence And a three-primary-colors display can be performed by setting combination with the color filter layer 4 which carries out color correction of the light of each color from the color conversion fluorescent substance layer 5, and raises color purity as a proper thing.
[0015]
Next, each configuration member of the organic electroluminescence image display device 1 of this invention is explained.
What consists of the glass ingredient which has light transmission nature, resin ingredients, and such composite material can be used for the transparence base material 2 which constitutes the organic electroluminescence image display device 1. The thickness of the transparence base material 2 can be set

up in consideration of the operating condition of an ingredient and an image display device etc., for example, can be set to about 0.1-1.1mm.
The black matrix 3 is equipped with opening 3a and protection-from-light section 3b by the predetermined pattern. Drawing 6 is the part plan showing the condition of having formed the color filter layer 4 through the black matrix 3 on the transparence base material 2, and in order to show the condition of the black matrix 3, where a part of red coloring layer 4R is cut and lacked, it is shown. Such a black matrix 3 forms metal thin films, such as chromium with a thickness of about 1000-2000A, with the sputtering method, a vacuum deposition method, etc. The polyimide resin which made protection-from-light nature particles which carried out patterning of this thin film, and formed it, such as a thing and a carbon particle, contain, It may be any which formed the photopolymer layer which made protection-from-light nature particles, such as what formed resin layers, such as acrylic resin and an epoxy resin, carried out patterning of this resin layer, and formed it, a carbon particle, and a metallic oxide, contain, and carried out patterning of this photopolymer layer, and formed it.
[0016]
Moreover, the color filter layer 4 carries out color correction of the light of each color from the color conversion fluorescent substance layer 5, and raises color purity. Blue coloring layer 4B which constitutes the color filter layer 4, red coloring layer 4R, and green stain layer 4G The red fluorescence from blue luminescence [from the blue organic EL device layer 10], and red conversion fluorescent substance layer 5R, And it can form with the pigment-content powder constituent which can choose an ingredient suitably according to the property of the green fluorescence from green conversion fluorescent substance layer 5G, for example, contains a pigment, a pigment agent, binder resin, a reactant compound, and a solvent. The color filter layer 4 can be formed by the pigment-content powder method which used the above-mentioned pigment-content powder constituent, and can be formed by the approach that print processes, an electrodeposition process, a replica method, etc. are still better known. The thickness of such a color filter layer 4 can be suitably set up according to the fluorescence which emits light from the ingredient of each coloring layer, and the color conversion fluorescent substance layer 5, for example, can be set up in the range which is about 1-3 micrometers.
[0017]
Red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G are the layer which consists of a fluorochrome simple substance, or the layer which contained the fluorochrome in resin among the color conversion fluorescent substance layers 5 which constitute the organic electroluminescence image display device 1. As a fluorochrome which uses blue luminescence for red conversion fluorescent substance layer 5R changed into red fluorescence Cyanine system coloring matter, such as a 4-dicyanomethylene-2-methyl-6-(p-dimethylaminostyryl)-4H-pyran, Rhodamine system coloring matter, such as pyridine coloring matter, such as 1-ethyl-2-[4-(p-dimethylamino phenyl)-1 and 3-swine dienyl]-pilus JIUMU-perchlorate, rhodamine B, and rhodamine 6G, oxazine system coloring matter, etc. are mentioned. moreover, as a fluorochrome which uses blue luminescence for green conversion fluorescent substance layer 5G changed into green fluorescence A 2, 3, 5, 6-1H, and 4H-tetrahydro-8-trifluoromethyl kino RIJINO (9,a [9], 1-gh) coumarin, Coumarin coloring matter, such as 3-(2'-benzothiazolyl)-7-diethylamino coumarin, 3-(2'-benzimidazolyl)-7-N, and N-diethylamino coumarin, The North America Free Trade Agreement RUIMIDO coloring matter of the coumarin pigment system color of BASIC yellow 51 grade, the solvent yellow 11, and solvent yellow 116 grade etc. is mentioned. Furthermore, it can be used if various colors, such as direct dye, acid dye, basic dye, and a disperse dye, also have fluorescence. The above fluorochromes can be used in independence or two or more sorts of combination. When red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G contain a fluorochrome in resin, although the content of a fluorochrome can be suitably set up in consideration of the thickness of the fluorochrome to be used and a color conversion fluorescent substance layer etc., it can be made into 0.1 - 1 weight section extent to the resin 100 weight section to be used, for example.
[0018]
Moreover, blue conversion dummy layer 5B can penetrate the blue glow which emitted light in the blue

organic EL device layer 10 as it is, can send it to the color filter layer 4, and can be used as the transparence resin layer of the almost same thickness as red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G.
When red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G contain a fluorochrome in resin, as resin, transparence (50% or more of light permeability) resin, such as polymethylmethacrylate, polyacrylate, a polycarbonate, polyvinyl alcohol, a polyvinyl pyrrolidone, hydroxyethyl cellulose, a carboxymethyl cellulose, polyvinyl chloride resin, melamine resin, phenol resin, alkyd resin, an epoxy resin, polyurethane resin, polyester resin, maleic resin, and polyamide resin, can be used. Moreover, when performing pattern formation of the color conversion fluorescent substance layer 5 by the photolithography method, the photo-curing mold resist resin which has reactant vinyl groups, such as an acrylic-acid system, a methacrylic-acid system, the Pori cinnamic-acid vinyl system, and a ring rubber system, can be used. Furthermore, these resin can be used for above-mentioned blue conversion dummy layer 5B.
[0019]
Red conversion fluorescent substance layer 5R which constitutes the color conversion fluorescent substance layer 5, and green conversion fluorescent substance layer 5G can be formed in band-like by the vacuum deposition method and the sputtering method through a desired pattern mask, when forming with a fluorochrome simple substance. Moreover, when forming as a layer containing a fluorochrome into resin, the coating liquid which made a fluorochrome and resin distribute or solubilize can be applied by the approach of a spin coat, a roll coat, a cast coat, etc., membranes can be formed, and red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G can be formed by the approach of carrying out patterning of this by the photolithography method, the approach of carrying out pattern printing of the above-mentioned coating liquid with screen printing etc., etc. Moreover, blue conversion dummy layer 5B can apply a desired photopolymer coating by the approach of a spin coat, a roll coat, a cast coat, etc., can be formed, and can be formed by the approach of carrying out patterning of this by the photolithography method, the approach of carrying out pattern printing of the desired resin coating liquid with screen printing etc., etc.
[0020]
The function for the thickness of such a color conversion fluorescent substance layer 5 to fully absorb the blue glow to which red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G emitted light in the blue organic EL device layer 10, and to generate fluorescence shall be discovered. In consideration of a fluorochrome, fluorochrome concentration, etc. to be used, it can set up suitably, for example, can be referred to as about 10-20 micrometers, and the thickness of red conversion fluorescent substance layer 5R and green conversion fluorescent substance layer 5G may differ.
[0021]
The transparent protection layer 6 which constitutes the organic electroluminescence image display device 1 is a lenticular lens configuration which it has so that lenticular lens element 6a which became a convex configuration at the blue organic EL device layer 10 side may be made in agreement with a picture element array, and makes the operation which condenses the light emitted to an omnidirection from the blue organic EL device layer 10 in the corresponding color conversion fluorescent substance layer 5 of a picture element. Moreover, when a level difference (surface irregularity) exists by the five or less color conversion fluorescent substance layer configuration, this level difference is canceled, flattening is attained and the planation which prevents thickness nonuniformity generating of the blue organic EL device layer 10 is made.
[0022]
Such transparent protection layer 6 can be formed with transparence (50% or more of light permeability) resin. Specifically, the photo-curing mold resin and heat-curing mold resin which have the reactant vinyl group of an acrylate system and a methacrylate system can be used. Moreover, polymethylmethacrylate, polyacrylate, a polycarbonate, polyvinyl alcohol, a polyvinyl pyrrolidone, hydroxyethyl cellulose, a carboxymethyl cellulose, polyvinyl chloride resin, melamine resin, phenol resin, alkyd resin, an epoxy

resin, polyurethane resin, polyester resin, maleic resin, polyamide resin, etc. can be used as transparence resin.

[0023]

In this invention, each lenticular lens element 6a is arranged by lenticular lens element 6a with which transparent protection layer 6 is equipped so that it may be located on each array (array of the picture element which exists between the septum sections 15 prepared in parallel in the example of drawing 1 and drawing 2) of a picture element, so that it may be in agreement with each picture element array. In consideration of the magnitude of a picture element, the refractive index of the resin ingredient to be used, etc., the light emitted to an omnidirection from the blue organic EL device layer 10 can set up the height (height h shown in drawing 2) of lenticular lens element 6a so that it may be condensed by the color conversion fluorescent substance layer 5 corresponding to the picture element (especially a focal location is not restricted), and it usually sets it to about 5-10 micrometers. Lenticular lens element 6a is high, and it obtains [luminescence by which thickness nonuniformity was occurred and stabilized in the blue organic EL device layer 10] and is not desirable if the convex configuration is remarkable.

[0024]

The transparent protection layer 6 of a lenticular lens configuration which has two or more lenticular lens element 6a can pressurize the transparence base material 2 with which the metal mold of a lenticular lens configuration was prepared, coating (restoration) of the above-mentioned resin ingredient was carried out to this metal mold, and the laminating even of the color conversion fluorescent substance layer 5 was carried out so that the color conversion fluorescent substance layer 5 may touch, it can stiffen a resin ingredient, and can be formed. Moreover, transparent protection layer 6 can be formed by creating the transparence resin sheet which has two or more lenticular lens element 6a, and sticking this transparence resin sheet through direct or a binder so that the color conversion fluorescent substance layer 5 may be covered by preparing the metal mold of a lenticular lens configuration, carrying out coating (restoration) of the above-mentioned resin ingredient to this metal mold, and making it harden it. Furthermore, transparent protection layer 6 can be formed by carrying out coating of the above-mentioned resin ingredient on the color conversion fluorescent substance layer 5, and pressing and carrying out press working of sheet metal of the metal mold of a lenticular lens configuration after that.

[0025]

It is desirable to prepare the inorganic oxide film as an insulating transparence barrier layer on the above-mentioned transparent protection layer 6 in this invention. This inorganic oxide film can be formed using one sort or two sorts or more of oxide, such as oxidization silicon, an aluminum oxide, titanium oxide, yttrium oxide, a germanium dioxide, a zinc oxide, magnesium oxide, a calcium oxide, boron oxide, a strontium oxide, the barium oxide, a lead oxide, a zirconium dioxide, sodium oxide, lithium oxide, and potassium oxide, and oxidization silicon, an aluminum oxide, and titanium oxide can use it suitably especially. The thickness of the inorganic oxide film can be suitably set up in 0.01-0.5 micrometers in consideration of barrier nature and transparency. Such inorganic oxide film may be a multilayer configuration more than two-layer, and may contain nitrides, such as silicon nitride, as an accessory constituent.

[0026]

Generally, a metallic material is used and the auxiliary electrode 7 which constitutes the organic electroluminescence image display device 1 can mention gold, silver, copper, Magnesium alloys (MgAg etc.), aluminium alloys (AlLi, AlCa, AlMg, etc.), metal calcium, etc. Such an auxiliary electrode 7 is arranged so that it may be located on the protection-from-light part of the black matrix 3 from a surrounding terminal area to a central pixel field.

Moreover, as an ingredient of the transparent electrode layer 8 which constitutes the organic electroluminescence image display device 1, the large (4eV or more) metal of a work function, alloys, and such mixture can be used, for example, electrical conducting materials, such as indium tin oxide (ITO), indium oxide, a zinc oxide, and a stannic oxide, can be mentioned. This transparent electrode layer 8 is arranged by band-like so that it may be located from a surrounding terminal area to a central pixel field on the opening part of the black matrix 3, and the above-mentioned auxiliary electrode 7.

Although below hundreds of ohms / ** have desirable sheet resistance and such a transparent electrode layer 8 is based also on the quality of the material, 10nm - 1 micrometer of thickness of the transparent electrode layer 8 can be preferably set to about 10-200nm, for example.
An auxiliary electrode 7 and the transparent electrode layer 8 can form a thin film by the vacuum deposition method and the sputtering method using an above-mentioned ingredient, and can make this a desired configuration by pattern etching using the photolithography method.
[0027]
The blue organic EL device layer 10 which constitutes the organic electroluminescence image display device 1 can be made into the structure which formed the hole injection layer in the structure [which formed the hole injection layer in the luminous layer structure / which becomes since independent / and transparent electrode layer / of a luminous layer / 8 side], structure [which formed the electronic injection layer in the back plate layer 11 side of a luminous layer], and transparent electrode layer 8 side of a luminous layer, and formed the electronic injection layer in the back plate layer 11 side.
The luminous layer which constitutes the blue organic EL device layer 10 has the following functions.
- Impregnation function : the function in which an electron hole can be poured in from an anode plate or a hole injection layer, and an electron can be poured in from cathode or an electronic injection layer at the time of electric-field impression
- The function to which the charge (an electron and electron hole) poured [which poured in and transportation-functioned] in is moved by the force of electric field
- Luminescence function : the function to offer the place of the recombination of an electron and an electron hole and to tie this to luminescence
[0028]
As an ingredient with such a function of a luminous layer, fluorescent brighteners, such as a benzothiazole system currently indicated by JP,8-279394,A, a benzimidazole system, and a benzooxazole system, a metal chelation oxy-NOIDO compound, a styryl benzenoid compound, a JISUCHIRIRU pyrazine derivative, an aromatic series JIMECHIRI DIN system compound, etc. can be mentioned, for example.
Specifically, it is 2-2'. -(p-phenylenedivinylene)- They are benzothiazole systems, such as a screw HENZO thiazole.; 2-[2-[4-(2-benzoimidazolyl) phenyl] vinyl] benzimidazole, Benzimidazole systems, such as 2-[2-(4-carboxyphenyl) vinyl] benzimidazole; 2, 5-screw (5, 7-G t-pentyl-2-benzoxazolyl) - 1, 3, 4-thiadiazole, Fluorescent brighteners, such as benzooxazole systems, such as a 4 and 4'-bis(5, 7-t-pentyl-2-benzoxazolyl) stilbene and 2-[2-(4-chlorophenyl) vinyl] [1 and 2-naphth d] oxazole, can be mentioned.
[0029]
Moreover, as the above-mentioned metal chelation oxy-NOIDO compound, 8-hydroxyquinoline system metal complexes, dilithium EPINTORI dione, etc., such as tris (eight quinolinol) aluminum, bis(eight quinolinol) magnesium, and bis([Benzof]-eight quinolinol) zinc, can be mentioned.
moreover, as the above-mentioned styryl benzenoid compound 1, 4-bis(2-methyl styryl) benzene, 1, 4-bis(3-methyl styryl) benzene, 1, 4-bis(4-methyl styryl) benzene, JISUCHIRIRU benzene, 1, 4-bis(2-ethyl styryl) benzene, 1, 4-bis(3-ethyl styryl) benzene, 1, 4-bis(2-methyl styryl)-2-methylbenzene, 1, and 4-bis(2-methyl styryl)-2-ethylbenzene etc. can be mentioned.
[0030]
moreover, as the above-mentioned JISUCHIRIRU pyrazine derivative 2, 5-bis(4-methyl styryl) pyrazine, 2, 5-bis(4-ethyl styryl) pyrazine, 2 and 5-bis[2-(1-naphthyl) vinyl] pyrazine, 2, 5-bis(4-methoxy styryl) pyrazine, 2, and 5-bis[2-(4-biphenyl) vinyl] pyrazine, 2, and 5-bis[2-(1-pyrenyl) vinyl] pyrazine etc. can be mentioned.
moreover, as the above-mentioned aromatic series JIMECHIRI DIN system compound 1, 4-phenylene dimethylidyne, 4, and 4-phenylene dimethylidyne, 2, 5-xylene JIMECHIRI DIN, 2,6-naphthylenedimethylidyne, 1,4-biphenylene dimethylidyne, 1, 4-p-terephenylene dimethylidyne, A 9, 10-anthracene G RUJIRU methylidyne, 4, and 4'-bis(2 and 2-G t-buthylphenyl vinyl) biphenyl, 4, and 4'-bis(2 and 2-diphenyl vinyl) biphenyl etc. can mention the derivative.

[0031]
Furthermore, the compound expressed with general formula (Rs-Q) 2-AL-O-L indicated by JP,5-258862,A as an ingredient of a luminous layer can also be mentioned (among the above-mentioned formula). AL is the hydrocarbon of 6-24 carbon atoms containing the benzene ring, and O-L is a FENIRATO ligand. Q is a permutation 8-quinolate ligand and Rs expresses 8-quinolate substituent chosen so that it might block in three dimensions that two or more permutation 8-quinolate ligands combine with an aluminum atom. Specifically, bis(2-methyl-8-quinolate) (PARA phenyl phenolate) aluminum (III), bis(2-methyl-8-quinolate) (1-naphth RATO) aluminum (III), etc. are mentioned. Especially a limit does not have the thickness of a luminous layer, for example, it can set it to 5nm - about 5 micrometers.
[0032]
It comes out to use it as an ingredient of a hole injection layer out of what is conventionally used as a hole-injection ingredient of a photo conductor, or the well-known thing currently used for the hole injection layer of an organic EL device, choosing the thing of arbitration. The ingredient of a hole injection layer may have impregnation of an electron hole, or electronic obstruction nature, and may be any of the organic substance or an inorganic substance. concrete -- a triazole derivative, an OKISA diazole derivative, an imidazole derivative, the poly aryl alkane derivative, a pyrazoline derivative, a pyrazolone derivative, a phenylenediamine derivative, an arylamine derivative, an amino permutation chalcone derivative, an oxazole derivative, a styryl anthracene derivative, and full -- me -- non, dielectric macromolecule oligomer, such as a derivative, a hydrazone derivative, a stilbene derivative, a silazane derivative, a polysilane system, an aniline system copolymer, and thiophene oligomer, etc. can be mentioned.
[0033]
Furthermore, a porphyrin compound, an aromatic series tertiary-amine compound, and a styryl amine compound can also be mentioned as an ingredient of a hole injection layer. As the above-mentioned porphyrin compound, poly fin, 1, 10 and 15, 20-tetrapod phenyl-21H, and 23H-poly fin copper (II), aluminum phthalocyanine chloride, a copper octamethyl phthalocyanine, etc. can be mentioned. moreover, as an aromatic series tertiary-amine compound and a styryl amine compound The N, N, N', and N'-tetra-phenyl -4, 4'-diamino phenyl, N, N'-diphenyl-N, N'-bis(3-methylphenyl)-[1 and 1'-biphenyl]-4, and 4'-diamine, 4-(G p-tolylamino)-4'-[4 (G p-tolylamino) Styryl] stilbene, A 3-methoxy-4'-N and N-diphenylamino still benzene, 4, and 4'-bis[N-(1-naphthyl)-N-phenylamino] biphenyl, 4, 4', a 4"-tris [N-(3-methylphenyl)-N-phenylamino] triphenylamine, etc. can be mentioned. Especially a limit does not have the thickness of a hole injection layer, for example, it can set it to 5nm - about 5 micrometers.
[0034]
Moreover, as the ingredient, it can be used out of a conventionally well-known compound that what is necessary is just to have the function to transmit the electron poured in from cathode to a luminous layer as an ingredient of an electronic injection layer, being able to choose the thing of arbitration. Specifically A nitration fluorene derivative, an anthra quinodimethan derivative, Heterocycle tetracarboxylic acid anhydrides, such as a diphenyl quinone derivative, a thiopyran dioxide derivative, and naphthalene perylene, A carbodiimide, a deflection ORENIRIDEN methane derivative, anthra quinodimethan, and an anthrone derivative, An OKISA diazole derivative, the thiazole derivative which permuted the oxygen atom of the above-mentioned oxadiazole ring by the sulfur atom, The metal complex of eight-quinolinol derivatives, such as a quinoxaline derivative with the quinoxaline ring known as an electron withdrawing group and tris (eight quinolinol) aluminum, a phthalocyanine, a metal phthalocyanine, a JISUCHIRIRU pyrazine derivative, etc. can be mentioned. Especially a limit does not have the thickness of an electronic injection layer, for example, it can set it to 5nm - about 5 micrometers.
[0035]
Formation of the blue organic EL device layer 10 can be performed by forming membranes with a vacuum deposition method etc. using the luminous layer ingredient which mentioned the septum section

15 above as a mask. By this approach, by forming membranes through the photo mask (mask for preventing the membrane formation to the electrode terminal which consists of the auxiliary electrode 7 and the transparent electrode layer 8 of a periphery) equipped with opening equivalent to an image display field, the septum section 15 can serve as a mask pattern, a luminous layer ingredient can pass only through between each septum section 15, and the transparent electrode layer 8 can be reached. Thereby, the band-like blue organic EL device layer 10 can be formed, without performing patterning, such as the photolithography method. In formation of the blue organic EL device layer 10 using such the septum section 15, as shown in drawing 1 and drawing 2 , the edge of the above-mentioned image display field is located in the up flat surface of the septum section 15 most located in a periphery among the arranged obstruction sections 15, and dummy organic EL device layer 10' is formed only in crosswise abbreviation one half (image display field side).

[0036]

Moreover, it is not the structure where the blue organic EL device layer 10 consists of a luminous layer independent. The structure which equipped the transparent electrode layer 8 side of a luminous layer with the hole injection layer, the structure which equipped the back plate layer 11 side of a luminous layer with the electronic injection layer, When making a hole injection layer into the structure which equipped the back plate layer 11 side with the electronic injection layer in preparation for the transparent electrode layer 8 side of a luminous layer, a band-like pattern can be formed like the above-mentioned luminous layer by forming membranes with a vacuum deposition method etc. using an above-mentioned hole injection layer ingredient and an electronic injection layer ingredient, respectively.

As an ingredient of the back plate layer 11 which constitutes the organic electroluminescence image display device 1, it is formed with the small (4eV or less) metal of a work function, alloys, and such mixture. Specifically, a sodium and sodium-potassium alloy, magnesium, a lithium, magnesium / copper mixture, magnesium / silver mixture, magnesium / aluminum mixture, magnesium / indium mixture, aluminum / aluminum oxide (aluminum 2O3) mixture, an indium, a lithium / aluminum mixture, a rare earth metal, etc. are mentioned. Considering the endurance over the oxidation as electron injection nature and an electrode etc., the mixture of an electron injectional metal and the second metal which is a metal with it is desirable, for example, magnesium / silver mixture, magnesium / aluminum mixture, magnesium / indium mixture, aluminum / aluminum oxide (aluminum 2O3) mixture, a lithium / aluminum mixture, etc. are mentioned. [the large value of a work function and] [more stable than this] Below hundreds of ohms / ** have desirable sheet resistance, and, for this reason, such a back plate layer 11 can set preferably 10nm - 1 micrometer of thickness of the back plate layer 11 to about 50-200nm, for example.

[0037]

By using the septum section 15 as a mask, using an above-mentioned electrode material, the above-mentioned back plate layer 11 can be formed by approaches, such as vacuum evaporation technique and ion plating vacuum deposition, and can be formed. That is, the septum section 15 can serve as a mask pattern, an electrode material can pass only through between each septum section 15, and it can reach on the blue organic EL device layer 10. And since it is not necessary to perform patterning, such as the photolithography method, the property of the blue organic EL device layer 10 is not degraded.

The insulating layer 13 which constitutes the organic electroluminescence image display device 1 is formed so that it may be located on the protection-from-light section of the black matrix 3. This insulating layer 13 can be formed with the same ingredient as transparent protection layer 6, and can form this as a desired configuration by pattern etching using the photolithography method. Thickness of such an insulating layer 13 can be set to about 1-5 micrometers.

[0038]

The septum section 15 which constitutes the organic electroluminescence image display device 1 is a septum pattern for forming the blue organic EL device layer 10 and the back plate layer 11 in band-like as mentioned above, so that the band-like transparent electrode layer 8 and a band-like right angle may be intersected. That is, the septum section 15 plays the role of the mask at the time of forming the blue organic EL device layer 10 and the back plate layer 11 with a vacuum deposition method etc. on the

transparent electrode layer 8. Such the septum section 15 applies a photopolymer by the approach of a spin coat, a roll coat, a cast coat, etc., forms membranes, by the photolithography method, can carry out patterning of this and can form it. It is realizable by the approach of changing the exposure direction and carrying out multiplex exposure of the photopolymer layer of the positive type which prepared in predetermined thickness in order to have considered as the configuration which narrows the septum section 15 the bottom in this way although the septum section 15 has the cross section of the reverse trapezoidal shape which narrows the bottom in the example shown in drawing 2 , or narrows a top, or a negative mold, the approach of carrying out multiplex exposure from a direction which shifts a pattern and is different, etc. As shown in drawing 2 , when the septum section 15 narrows the bottom, adhesion in the insulating layer 13 which is a lower layer of the septum section 15 can be avoided in the case of the vacuum evaporationo from a normal. The height of the septum section 15 can respond to about 1-20 micrometers, width of face can respond to the width of face of the protection-from-light section of the black matrix 3 etc., and it can set up, and usually considers as width of face thinner about 2 micrometers than black matrix width of face.

[0039]

In this invention, concavo-convex structure may be prepared in the front face of lenticular lens element 6a which transparent protection layer 6 has. In this case, the average of the distance from the straight line which connects between the top-most vertices of the heights which concavo-convex structure adjoins within the limits of 0.1-5 micrometers in the average of the distance between the top-most vertices of the heights which concavo-convex structure adjoins to the bottom point of the crevice perpendicularly located between heights can be made into within the limits of 0.1-5 micrometers. By having such concavo-convex structure, the effectiveness of the condensing operation by the transparent protection layer 6 of a lenticular lens configuration improves further. It becomes [become larger than lenticular lens element 6a and structure formation becomes difficult, and / the layer (for example, auxiliary-electrode 7, transparent electrode layer 8, organic EL device layer 10 septum section 15 grade) formation after this transparent protection layer 6] difficult and is not desirable, if the effectiveness equipped with concavo-convex structure as the mean distance between the above-mentioned contiguity heights and the mean distance from heights top-most vertices to a crevice bottom point are under the above-mentioned range is not acquired and the above-mentioned range is exceeded.

[0040]

In order to prepare the above concavo-convex structures in the front face of lenticular lens element 6a, the bead is mixed in the resin ingredient for transparent-protection-layer 6 above-mentioned formation, and a convex configuration can be formed in a front face using contraction (shaping return phenomenon) of the resin after lenticular lens shaping using metal mold. The resin bead which acrylic resin, vinyl chloride system resin, styrene resin, polyolefin resin, polyester resin, and polycarbonate resin were made to construct a bridge, and was made into immiscible nature and non-thermoplasticity as the above-mentioned bead, the glass bead which adjusted the refractive index can be used. Moreover, the shape of toothing can be formed in the front face of the metal mold of an above-mentioned lenticular lens configuration by chemical preparation or physical processing, and lenticular lens element 6a which has concavo-convex structure can be formed using the metal mold of this lenticular lens configuration. As the above-mentioned chemical preparation, etching processing is mentioned and polish processing, blasting processing, glow discharge processing, corona discharge treatment, etc. are mentioned as physical processing.

[0041]

[Example]

Next, an example is shown and this invention is further explained to a detail.

[Example]

Formation of a black matrix

As a transparence base material, 150mmx150mm and soda glass (Sn side polish article by Central Glass Co., Ltd.) with a thickness of 0.7mm were prepared. After washing according to a method, the thin film (thickness of 0.2 micrometers) of oxidation nitriding compound chromium is formed by the sputtering

method all over one side of a transparence base material. this transparence base material -- a law -- A photosensitive resist is applied on this compound chromium thin film. Mask exposure, development, The compound chromium thin film was etched and the black matrix equipped with opening of the shape of a 80micrometerx280micrometer rectangle in the shape of a matrix in 300-micrometer pitch in 100-micrometer pitch and the direction of 280-micrometer opening side in the above-mentioned direction of 80-micrometer opening side was formed.

[0042]

Formation of a color filter layer

Red and three sorts of photosensitive green and blue coatings for coloring layers were prepared. That is, the photosensitive coating for red coloring layers made binder resin distribute items, such as a perylene system pigment, a lake pigment, azo pigment, the Quinacridone system pigment, an anthraquinone system pigment, an anthracene system pigment, and isoindole pigment, or the coloring matter which consists of two or more sorts of mixture. As binder resin, transparent (50% or more of light transmission) resin is desirable, for example, transparence resin, such as polymethylmethacrylate, polyacrylate, a polycarbonate, polyvinyl alcohol, a polyvinyl pyrrolidone, hydroxyethyl cellulose, and a carboxymethyl cellulose, is mentioned. Moreover, the content of a coloring matter was set up so that it might contain five to 50% of the weight in the formed coloring layer.

[0043]

The photosensitive coating for green stain layers made binder resin distribute items, such as halogen multi-permutation phthalocyanine pigment, a halogen multi-permutation copper-phthalocyanine system pigment, triphenylmethane color system basic dye, isoindole pigment, and an isoindolinone system pigment, or the coloring matter which consists of two or more sorts of mixture. As binder resin, the above-mentioned transparence resin was mentioned, and the content of a coloring matter was set up so that it might contain five to 50% of the weight in the formed coloring layer.

The photosensitive coating for blue coloring layers made binder resin distribute items, such as a copper-phthalocyanine system pigment, an indanthrene system pigment, an indophenol system pigment, a cyanine system pigment, and a dioxazine system pigment, or the coloring matter which consists of two or more sorts of mixture. As binder resin, the above-mentioned transparence resin was mentioned, and the content of a coloring matter was set up so that it might contain five to 50% of the weight in the formed coloring layer.

[0044]

Next, the coloring layer of each color was formed using three sorts of above-mentioned photosensitive coatings for coloring layers. Namely, it prebaked all over the above-mentioned transparence base material with which the black matrix was formed by applying the photosensitive coating for green stain layers with a spin coat method (for 80 degrees C and 30 minutes). Then, it exposed using the predetermined photo mask for coloring layers. Subsequently, negatives were developed with the developer (0.05%KOH water solution), and subsequently, postbake (for 100 degrees C and 30 minutes) was performed, and the band-like (width of face of 85 micrometers) green stain layer (thickness of 1.5 micrometers) was formed in the position to the black matrix pattern.

Similarly, the band-like (width of face of 85 micrometers) red coloring layer (thickness of 1.5 micrometers) was formed in the position to the black matrix pattern using the photosensitive coating of a red coloring layer. Furthermore, the band-like (width of face of 85 micrometers) blue coloring layer (thickness of 1.5 micrometers) was formed in the position to the black matrix pattern using the photosensitive coating of a blue coloring layer.

[0045]

Formation of a color conversion fluorescent substance layer

Next, it prebaked by applying the coating liquid for blue conversion dummy layers (color mosaic CBmade from Fuji Hunt Electronics Technology- 7001) on a coloring layer with a spin coat method (for 80 degrees C and 30 minutes). Subsequently, patterning was performed by the photolithography method and postbake (for 100 degrees C and 30 minutes) was performed. This formed the band-like (width of face of 85 micrometers) blue conversion dummy layer (thickness of 10 micrometers) on the blue

coloring layer.
Subsequently, alkali fusibility negative resist which distributed the green conversion fluorescent substance (Aldrich coumarin 6) was used as the coating liquid for green conversion fluorescent substance layers, and it prebaked by applying this on a coloring layer with a spin coat method (for 80 degrees C and 30 minutes). Subsequently, patterning was performed by the photolithography method and postbake (for 100 degrees C and 30 minutes) was performed. This formed the band-like (width of face of 85 micrometers) green conversion fluorescent substance layer (thickness of 10 micrometers) on the green stain layer.
[0046]
Furthermore, alkali fusibility negative resist which distributed the red conversion fluorescent substance (Aldrich rhodamine 6G) was used as the coating liquid for red conversion fluorescent substance layers, and it prebaked by applying this on a coloring layer with a spin coat method (for 80 degrees C and 30 minutes). Subsequently, patterning was performed by the photolithography method and postbake (for 100 degrees C and 30 minutes) was performed. This formed the band-like (width of face of 85 micrometers) red conversion fluorescent substance layer (thickness of 10 micrometers) on the red coloring layer.
[0047]
Formation of the transparent protection layer of a lenticular lens configuration
The metal mold equipped with the crevice with height of 8 micrometers, a width of face [of 90 micrometers], and a die length of 290 micrometers for lenticular lens element formation in 100-micrometer pitch and the 290-micrometer die-length direction in 300-micrometer pitch crosswise [above-mentioned / 90 micrometer] was prepared.
Subsequently, spreading restoration of the coating liquid for transparent protection layer which diluted with toluene the norbornene system resin (ARTON made from JSR) whose mean molecular weight is about 100000 was carried out by the bar coat method at the above-mentioned metal mold, and where a metal plate is stuck by pressure, it heated (for 100 degrees C and 30 minutes). This produced the sheet for transparent protection layer of a lenticular lens configuration. This sheet for transparent protection layer was equipped with the lenticular lens element with height of 8 micrometers, a width of face [of 90 micrometers], and a die length of 290 micrometers, and the thickness of the part except a lenticular lens element was 3 micrometers.
Next, the above-mentioned sheet for transparent protection layer was stuck on the transparence base material so that a color conversion fluorescent substance layer might be covered in a lenticular lens element agenesis side side, and transparent protection layer was formed. Here, alignment was performed so that each lenticular lens element might be located on the opening train of the black matrix arranged in the direction which intersects perpendicularly with the above-mentioned band-like color filter layer or a color conversion fluorescent substance layer.
[0048]
Formation of an auxiliary electrode
Next, the chromium thin film (thickness of 0.2 micrometers) was formed by the sputtering method the whole surface on the above-mentioned transparent protection layer, on this chromium thin film, the photosensitive resist was applied, etching of mask exposure, development, and a chromium thin film was performed, and the auxiliary electrode was formed. This auxiliary electrode runs aground on a color conversion fluorescent substance layer from on a transparence base material, as two or more lenticular lens elements of a boiled-fish-paste configuration are overcome one by one, it shall be the pattern of the shape of a stripe formed on transparent protection layer, and on a color conversion fluorescent substance layer, it shall be located on the protection-from-light section of a black matrix by width of face of 15 micrometers, and width of face shall be 60 micrometers in the terminal area of the transparence base material periphery section.
[0049]
Formation of a transparent electrode layer
Subsequently, the indium-tin-oxide (ITO) electrode layer of 150nm of thickness was formed by the ion

plating method on transparent protection layer so that the above-mentioned auxiliary electrode might be covered, on this ITO electrode layer, the photosensitive resist was applied, etching of mask exposure, development, and an ITO electrode layer was performed, and the transparent electrode layer was formed. It was a band-like pattern with a width of face of 80 micrometers formed so that it might run aground on a color conversion fluorescent substance layer from on a transparence base material and two or more lenticular lens elements of a boiled-fish-paste configuration might be overcome one by one, and on the color conversion fluorescent substance layer, this transparent electrode layer was what laps with the above-mentioned auxiliary electrode while it was located on each coloring layer of a color filter layer.

[0050]

Formation of an insulating layer and the septum section

The coating liquid for transparent protection layer which diluted with toluene the norbornene system resin (ARTON made from JSR) whose mean molecular weight is about 100000 was used, after applying on a transparence barrier layer so that a transparent electrode layer may be covered with a spin coat method, BEKU (for 100 degrees C and 30 minutes) was performed, and the insulator layer (thickness of 1 micrometer) was formed. Next, on this insulator layer, the photosensitive resist was applied, mask exposure, development, and etching of an insulator layer were performed, and the insulating layer was formed. This insulating layer has been arranged so that opening of an insulating layer may be located in opening of a black matrix, and it made opening of an insulating layer the 90micrometerx290micrometer shape of a larger rectangle than black matrix opening.

Next, it prebaked by applying the coating for the septum sections (photoresist by Nippon Zeon Co., Ltd. ZPN1100) to the whole surface so that an insulating layer may be covered with a spin coat method (for 70 degrees C and 30 minutes). Then, it exposed using the predetermined photo mask for the septum sections, negatives were developed with the developer (ZTMA[by Nippon Zeon Co., Ltd.]- 100), and, subsequently postbake (for 100 degrees C and 30 minutes) was performed. This formed the septum section on the insulating layer. This septum section was what has the configuration which are height of 10 micrometers, lower (insulating-layer side) width of face of 15 micrometers, and upside width of face of 26 micrometers.

[0051]

Formation of a blue organic EL device layer

Subsequently, the blue organic EL device layer which consists of a hole injection layer, a luminous layer, and an electronic injection layer with a vacuum deposition method was formed by using the above-mentioned septum section as a mask. First namely, 4, 4', and a 4"-tris [N-(3-methylphenyl)-N-phenylamino] triphenylamine Membranes are vapor-deposited and formed to 200nm thickness through the photo mask equipped with opening equivalent to an image display field. Then, by vapor-depositing a 4 and 4'-bis[N-(1-naphthyl)-N-phenylamino] biphenyl to 20nm thickness, and forming membranes, the septum section became a mask pattern, the hole injection layer ingredient passed only through between each septum section, and the hole injection layer was formed on the transparent electrode layer.

Similarly, it considered as the luminous layer by vapor-depositing a 4 and 4'-bis(2 and 2-diphenyl vinyl) biphenyl to 50nm, and forming membranes. Then, it considered as the electronic injection layer by vapor-depositing tris (eight quinolinol) aluminum to 20nm thickness, and forming membranes. Thus, the formed blue organic EL device layer exists between each septum section as a band-like pattern with a width of face of 280 micrometers (it exists on each lenticular lens element), and the dummy blue organic EL device layer was formed by the same lamination also as the up front face of the septum section.

[0052]

Formation of a back plate layer

Next, to the field in which the above-mentioned septum section is formed through the photo mask equipped with predetermined opening larger than an image display field, magnesium and silver were vapor-deposited to coincidence with the vacuum deposition method (the evaporation rate of the evaporation rate =1.3-1.4nm/second of magnesium, and silver = 0.1nm/(second)), and membranes were formed.

The back plate layer (thickness of 200nm) which the septum section serves as a mask and becomes from magnesium / silver mixture by this was formed on the blue organic EL device layer. This back plate layer exists on a blue organic EL device layer as a band-like pattern with a width of face of 280 micrometers, and the dummy back plate layer was formed also in the up front face of the septum section.

[0053]
The organic electroluminescence image display device was obtained by the above. The blue organic EL device layer of the desired part where a transparent electrode layer and a back plate layer cross was made to emit light by making the transparent electrode layer and back plate layer of this organic electroluminescence image display device impress and carry out the continuation drive of the electrical potential difference of direct-current 8.5V with the fixed current density of 10 mA/cm2. And the CIE chromaticity coordinate (JIS Z 8701) was measured about luminescence of each color which is the opposite side side of a transparence base material, and is observed in a color conversion fluorescent substance layer color conversion or after penetrating as it is and carrying out color correction in a color filter layer. Consequently, blue luminescence of x= 0.13 and y= 0.17 was checked by x= 0.64 and red luminescence of y= 0.36 by the CIE chromaticity coordinate, and was checked by the CIE chromaticity coordinate by green luminescence of x= 0.26 and y= 0.63, and the CIE chromaticity coordinate, and the high three-primary-colors image display of color purity was possible by high brightness (85 cd/m2).
[0054]
[The example of a comparison]
After using the same coating liquid for transparent protection layer as an example and applying on a transparence base material with a spin coat method, transparent protection layer (thickness of 5 micrometers) was formed so that a color conversion fluorescent substance layer might be covered by carrying out BEKU (for 100 degrees C and 30 minutes), and also the organic electroluminescence image display device was obtained like the example.
The electrical potential difference was impressed to this organic electroluminescence image display device like the example, image display quality was observed, and the CIE chromaticity coordinate (JIS Z 8701) was measured about luminescence of each color. Consequently, blue luminescence of x= 0.14 and y= 0.18 was checked by x= 0.62 and red luminescence of y= 0.37 by the CIE chromaticity coordinate, and was checked by the CIE chromaticity coordinate by green luminescence of x= 0.27 and y= 0.63, and the CIE chromaticity coordinate, although three-primary-colors image display was possible, color purity was a little inadequate, brightness (80 cd/m2) was low, and the high three-primary-colors image display of color purity was not obtained by high brightness.
[0055]
[Effect of the Invention]
Since the light emitted to an omnidirection from an organic EL device layer is condensed by the color conversion fluorescent substance layer of a picture element which corresponds by the lenticular lens element prepared in transparent protection layer according to this invention as explained in full detail above Carrying out incidence to the color conversion fluorescent substance layer of other adjoining picture elements at the same time the use effectiveness of the light emitted from the organic EL device layer improves sharply and luminescence brightness increases is prevented, and color purity improves. By this The organic electroluminescent image display device in which the image display of high quality is possible is obtained. Moreover, by preparing concavo-convex structure in the front face of a lenticular lens element, the light emitted to an omnidirection from an organic EL device layer is condensed at higher effectiveness, and the above-mentioned effectiveness will become more remarkable.
[Brief Description of the Drawings]
[Drawing 1] It is the part plan showing 1 operation gestalt of the organic electroluminescent image display device of this invention.
[Drawing 2] It is drawing of longitudinal section in the II-II line of the organic electroluminescent image display device shown in drawing 1 .
[Drawing 3] It is drawing of longitudinal section in the III-III line of the organic electroluminescent

image display device shown in drawing 1 .
[Drawing 4] It is the part plan showing the physical relationship of the color filter layer and color conversion fluorescent substance layer in the organic electroluminescent image display device of this invention.
[Drawing 5] It is the part plan showing the condition of the auxiliary electrode formed on transparent protection layer in the organic electroluminescent image display device of this invention, and a transparent electrode layer.
[Drawing 6] It is the part plan showing the condition of having formed the color filter layer through the black matrix on the transparence base material.
[Description of Notations]
1 -- Organic electroluminescent image display device
2 -- Transparence base material
3 -- Black matrix
4 -- Color filter layer
4R, 4G, 4B -- Coloring layer
5 -- Color conversion fluorescent substance layer
5R -- Red conversion fluorescent substance layer
5G -- Green conversion fluorescent substance layer
5B -- Blue conversion dummy layer
6 -- Transparent protection layer
6a -- Lenticular lens element
7 -- Auxiliary electrode
8 -- Transparent electrode layer
10 -- Organic electroluminescent element layer
11 -- Back plate layer
13 -- Insulating layer
15 -- Septum section

[Translation done.]